

Curve Sketching (4.6)

To sketch the graph of a function, use google or maple or wolframalpha or geogebra . . . !

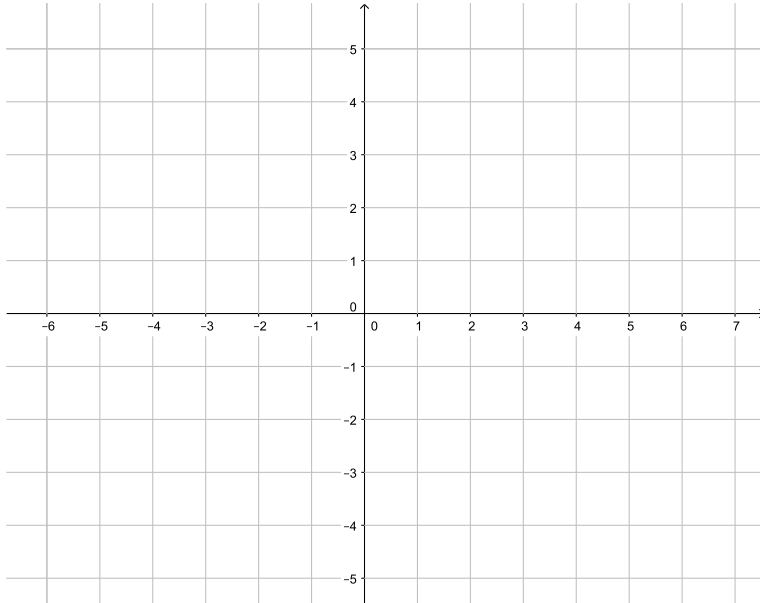
If no technology is available or allowed, then we can use calculus and pre-calculus to sketch the graph of a function $f(x)$. We first find "transition points" that make f , f' , and f'' zero, locate all intercepts, max's, min's, and inflection points, and finally find the vertical and horizontal asymptotes.

Sketch the graph of $h(x) = x(4 - x) - 3 \ln(x)$ if given $h(x) = 0 \implies x \approx 2.9$.

Sketch the curve of a function $f(x)$ that satisfies all of the given conditions.

$$f'(x) > 0 \text{ for all } x \neq 1, \quad \text{vertical asymptote is } x = 1,$$

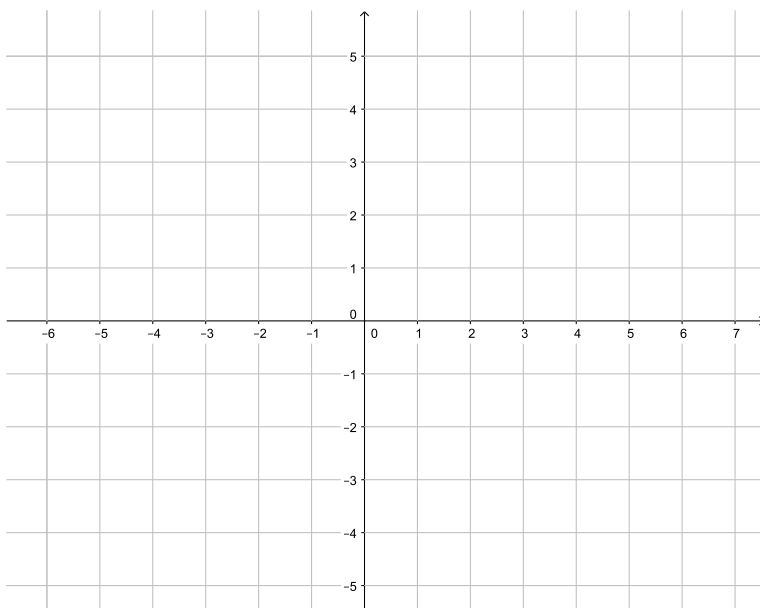
$$f''(x) > 0 \text{ if } x < 1 \text{ or } x > 3, \quad f''(x) < 0 \text{ if } 1 < x < 3$$



Sketch the curve of a function $g(x)$ that satisfies all of the given conditions.

$$g'(0) = g'(2) = g'(4) = 0 \quad g'(x) > 0 \text{ if } x < 0 \text{ or } 2 < x < 4$$

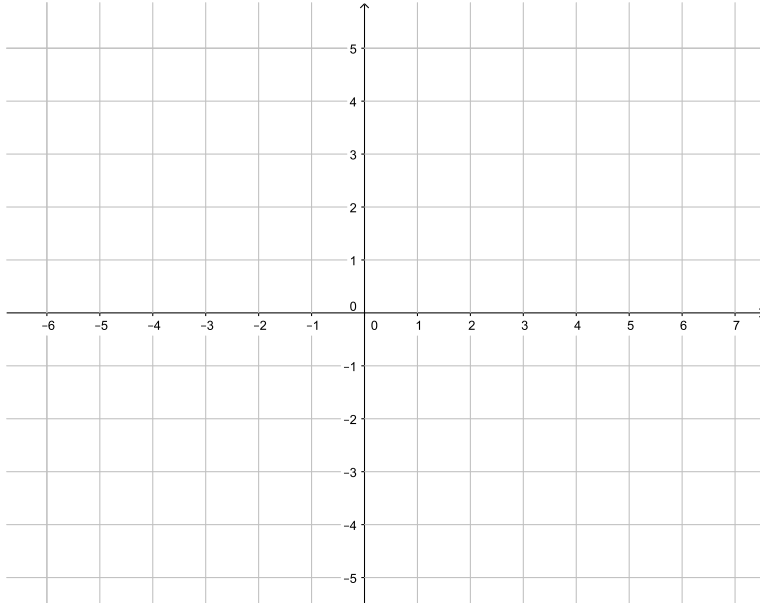
$$g'(x) < 0 \text{ if } 0 < x < 2 \text{ or } x > 4, \quad g''(x) > 0 \text{ if } 1 < x < 3, \quad g''(x) < 0 \text{ if } x < 1 \text{ or } x > 3.$$



Sketch the curve of a function $h(x)$ that satisfies all of the given conditions.

$$h'(x) > 0 \text{ if } |x| < 2, \quad h'(x) < 0 \text{ if } |x| > 2, \quad h(2) = 3$$

$$h'(-2) = 0 \quad \lim_{x \rightarrow 2} |h'(x)| = \infty \quad h''(x) > 0 \text{ if } x \neq 2.$$



Sketch the curve of a function $k(x)$ that satisfies all of the given conditions.

$$k(3) = 2 \quad k'(3) > 0.5 \quad k'(x) > 0 \quad k''(x) < 0$$

Is it possible that $k'(2) = \frac{1}{3}$? Defend your answer.

